IB MYP YEAR 5

ASSESSMENT TASK

Patterns in Probability

Subject:	Y10 ***Standard*** Mathematics	**Name :\ (Class)**	ANDREW LAU ( ) 10 Hope Ms. LUK
Topic:	**Patterns in Probability**		
Date of assessment:	**Thursday 1st December (session 2)**		

- **This task assesses Criteria B and C**
- **Time allowed – *one hour***
- **Write your answers on the file paper provided. GDCs are allowed.**

ADVICE:
Read the criteria descriptors and task-specific clarifications carefully before you start your work. This will give you a clear understanding of what is required and what a high quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest levels in this task.

Criterion B

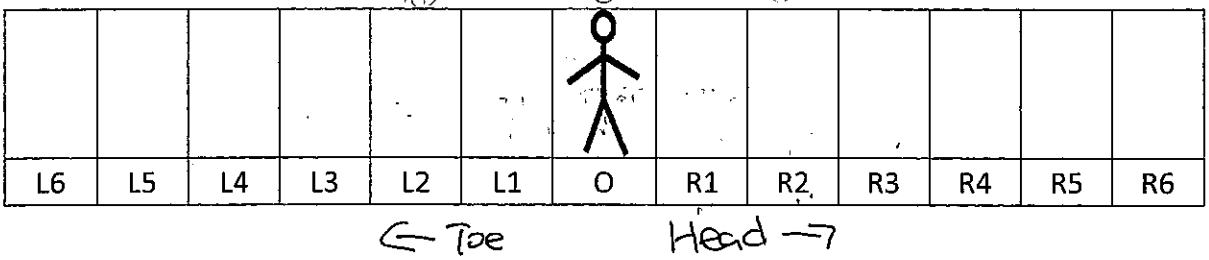
Levels	Task-Specific Clarification	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	You are able to answer the early questions, and order your answers in a way that reveals patterns.	The student **applies, with some guidance,** mathematical problem-solving techniques to recognize simple patterns.
3-4 (3)	You develop appropriate systematic methods in order to answer the questions. The results you get help you to suggest a mathematical pattern or patterns.	The student **applies** mathematical problem-solving techniques to recognize patterns, **and suggests** relationships or general rules.
5-6	You continue with the questions, and use some of your answers as a check on your findings. You need to have Q8 correctly answered to achieve a mark in this band.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, and **draws conclusions** consistent with findings.
7-8	You can justify/prove your answers to questions 7 and 12.	The student **selects and applies** mathematical problem-solving techniques to recognize patterns, **describes** them as relationships or general rules, draws the **correct conclusions** consistent with findings, and **provides justifications or a proof.**

Criterion C

Levels	Task-Specific Clarification	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	The narrative is basic. Mathematical symbols are used, perhaps with ***some*** errors or inconsistencies.	The student shows **basic use** of mathematical language and/or forms of mathematical representation. The lines of reasoning are **difficult to follow.**
3-4 (3)	The narrative is reasonably easy to follow. Mathematical language is used in a generally accurate way. Mathematical notation is used with few errors.	The student shows **sufficient use** of mathematical language and forms of mathematical representation. The lines of reasoning are **clear though not always logical or complete.** The student moves between different forms of representation with **some success.**
5-6	The narrative is easy to follow. Mathematical arguments are presented logically. Mathematical vocabulary and notation are used accurately and appropriately.	The student shows **good** use of mathematical language **and** forms of mathematical representation. The lines of reasoning are **concise, logical** and **complete.** The student moves **effectively** between different forms of representation.

A Random Walk

Throughout this task, you are strongly advised to write probabilities using fractions, rather than decimals or percentages.



A man stands at O and tosses a coin. If the coin lands on Heads he moves one step to the right (in the R-Direction). If the coin lands on Tails, he moves one step to the left (in the L-Direction)

1. How many different positions could the man occupy after 1 toss of the coin? Name these positions and find the probability of him being in each of them.

The man tosses the coin for a second time, with the same rule applying (Heads means he moves one step to the right, Tails means one step to the left).

2. How many different positions could the man occupy after 2 tosses of the coin? Name these positions and find the probability of him being in each of them.

The man continues with the coin-tossing and the moving.

3. How many different positions could the man occupy after 3 tosses of the coin? Name these positions and find the probability of him being in each of them (note: there may be more than one way in which the man can end up at a given position)

4. How many different positions could the man occupy after 4 or 5 tosses of the coin? Name these positions and find the probability of him being in each of them.

5. Summarise your results in an appropriate diagram or chart and comment on any patterns that are evident.

6. Based on your results, or otherwise, how many positions could he occupy after n tosses of the coin?

7. Prove or justify your answer to question 6

8. Based on your response to question 5 predict the probability the man lands at R4 after 8 tosses of the coin.

9. What is the most likely finishing position after 4 tosses? Explain your answer

10. What is the most likely finishing position after 6 tosses? Explain your answer

11. What is the most likely finishing position after an even number of tosses?

12. Prove/Justify your answer to Q11.

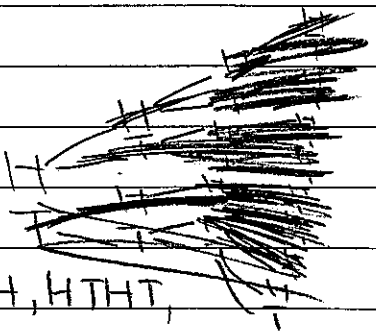
Andrew Lau
F10 Hope
Ms. Luk

1. Position 1 = R1
Position 2 = ~~R2~~ L1
$P(R1) = \frac{1}{2}$
$P(R2\ L1) = \frac{1}{2}$

2. ~~S = R1R2,~~ ~~S = R2, R1, 0, L1, L2~~
~~P(HH) ∩ P(TT) ∩ P(HT) ∩ P(TH)~~
~~P(R1)~~
S = 0, ~~R1~~ R2, L2 $P = \frac{1}{8}$
~~P(HH) ∩ P(HT) ∩ P(TT) ∩ P(TH) = $\frac{2}{3}$~~ $\frac{1}{3}$

3. S = ~~0~~, R2, R3, L2, L3, L1, R1
~~P(H) ∩ P(H) ∩ P(H) ∪~~
~~P(HHH) ∩ P(HTH) ∩ P(HHT) ∩ P(THH) ∩ P(TTT) ∩ P(THT)~~
P on each space = ~~$\frac{3}{8}$~~ $\frac{1}{32}$

4. ~~P(HHHH), P(HHHT), P(HHT), P(HTT), P(TTT), P(THT),~~
~~P(THT), P(THHH),~~
S = R4, R3, R2, R1, L4, L2, 0,
~~R5~~
P(4 tosses) = $\frac{1}{128}$
P(5 tosses) = $\frac{1}{512}$



S = HHHHH, HHHT, HHTH, HHTT, HTHH, HTHT,
HTTH, HTTT, THHH, THHT, THTH, THTT,
TTHH, TTHT, TTTH, TTTT

Positions: 0, L1, L2, L3, L4, L5, R1, R2, R3, R4, R5
$P = (\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2})$ 1/16

5

6. $2(0.5^{(n+1)})(0.5^{(n-1)})$

7. When substitute n with 1 toss, the result of this equation is $\frac{1}{2}$, which is the same as the answer of Q1

8. 32768

9. The probability of the position after 4 tosses, is all $\frac{1}{2}$, because the chance of a head and a tail is always the same.

10. Again all the positions are equally likely since the chance of a head and a tail is $\frac{1}{2}$